

3.3.1 Existing Activity Centers

The SANDAG data defines activity centers as a community's major employers, office buildings, industrial sites, government sites, retail centers, hospitals, major attractions, colleges, universities, schools or parks and open space. The commercial and retail activity centers can also be regarded as employment centers because, in addition to the customers that constitute the typical activity center users, they also represent significant numbers of employees. Chula Vista's major retail centers are represented in SANDAG's data within the highest employment density category. The civic activity centers include Chula Vista's parks and schools, which are discussed in a following section.

Reviewing a map of the existing activity centers (See Figure 7: Activity Centers) confirms that there is an abundance of major employers, office buildings and industrial sites clustered in the area immediately around the main thoroughfares running through downtown Chula Vista. Based solely on this map, it appears to be the commercial and office hub of Chula Vista. However, comparing the activity center information map with the existing employment density map (See Figure 6: 2000 Employment Density) reveals that the employment density is just as high in other areas of Chula Vista. These other areas have few office buildings or major employers, but still have high employment density, which indicates that they encompass large numbers of smaller businesses. Employment density is an indicator of bike-way facility demand in general, but more specifically, it is an indicator for shopping trips to areas with numerous small businesses versus commuting trips to areas with major employers.

There are a number of activity centers and destinations in the western coastal portion of the City and many have a long association with the historic community center of downtown Chula Vista. In recent years, a newer cluster of activity centers and destinations have been developed in the eastern portion of the City, centered in EastLake and other Otay Ranch master planned communities, essentially constituting a second city center. Population increases in this area are expected to continue, making this one of the fastest growing urban centers in the region.

Overall, activity centers tend to be well served by bicycle facilities. East of I-805, they lie well within an acceptable distance from their nearest adjacent bicycle facilities. This is due to the local topography that drove the pattern of development and roadways, placing major roads and activity centers on east-west ridge lines. West of I-805, the development pattern is a traditional street grid that provides multiple routes to any particular destination.

The downtown area has concentrations of retail centers along Broadway and Third Avenue. However, there are relatively limited bicycle facilities in the portion of Chula Vista west of Fourth Avenue.



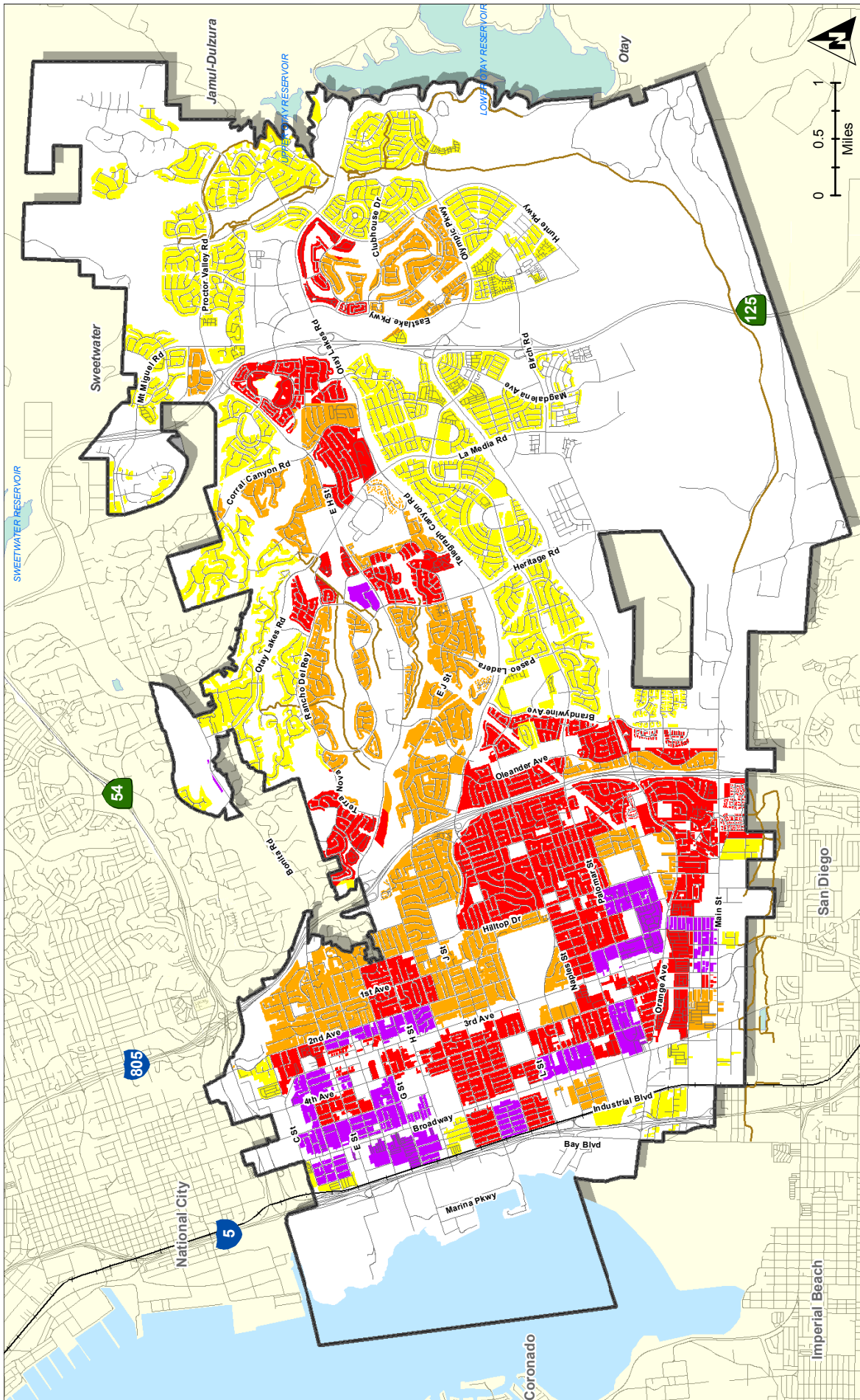
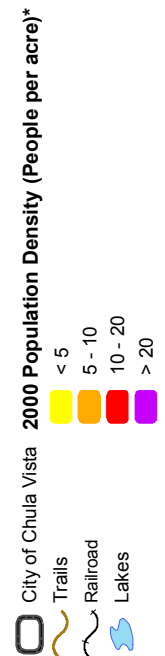


Figure 5: 2000 Population Density



* Source: 2000 Census

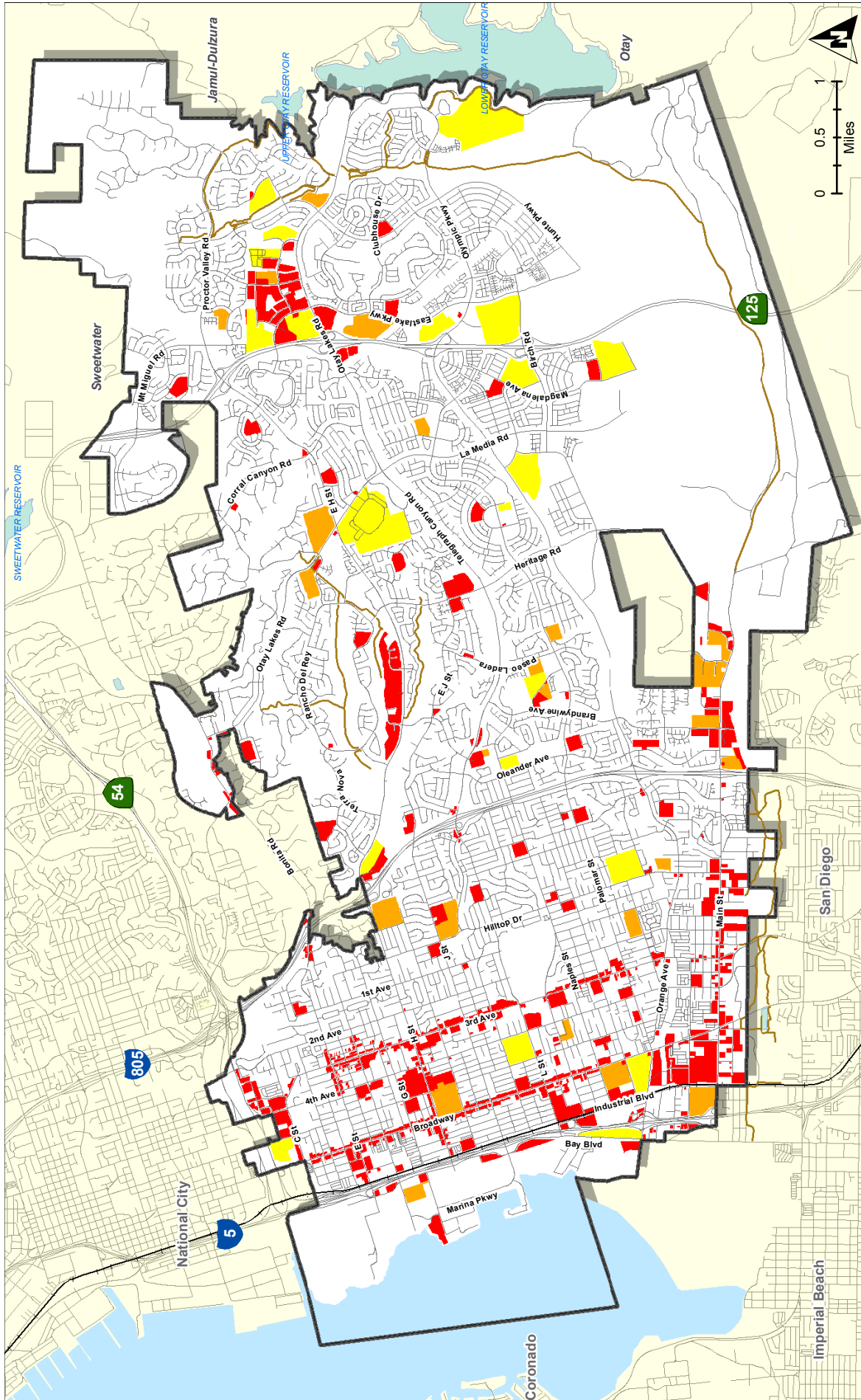


Figure 6: 2000 Employment Density

City of Chula Vista 2000 Employment Density (People per acre)*

- < 20
- 21 - 40
- > 40

- City of Chula Vista
- Trails
- Railroad
- Lakes

* Source: 2000 Census

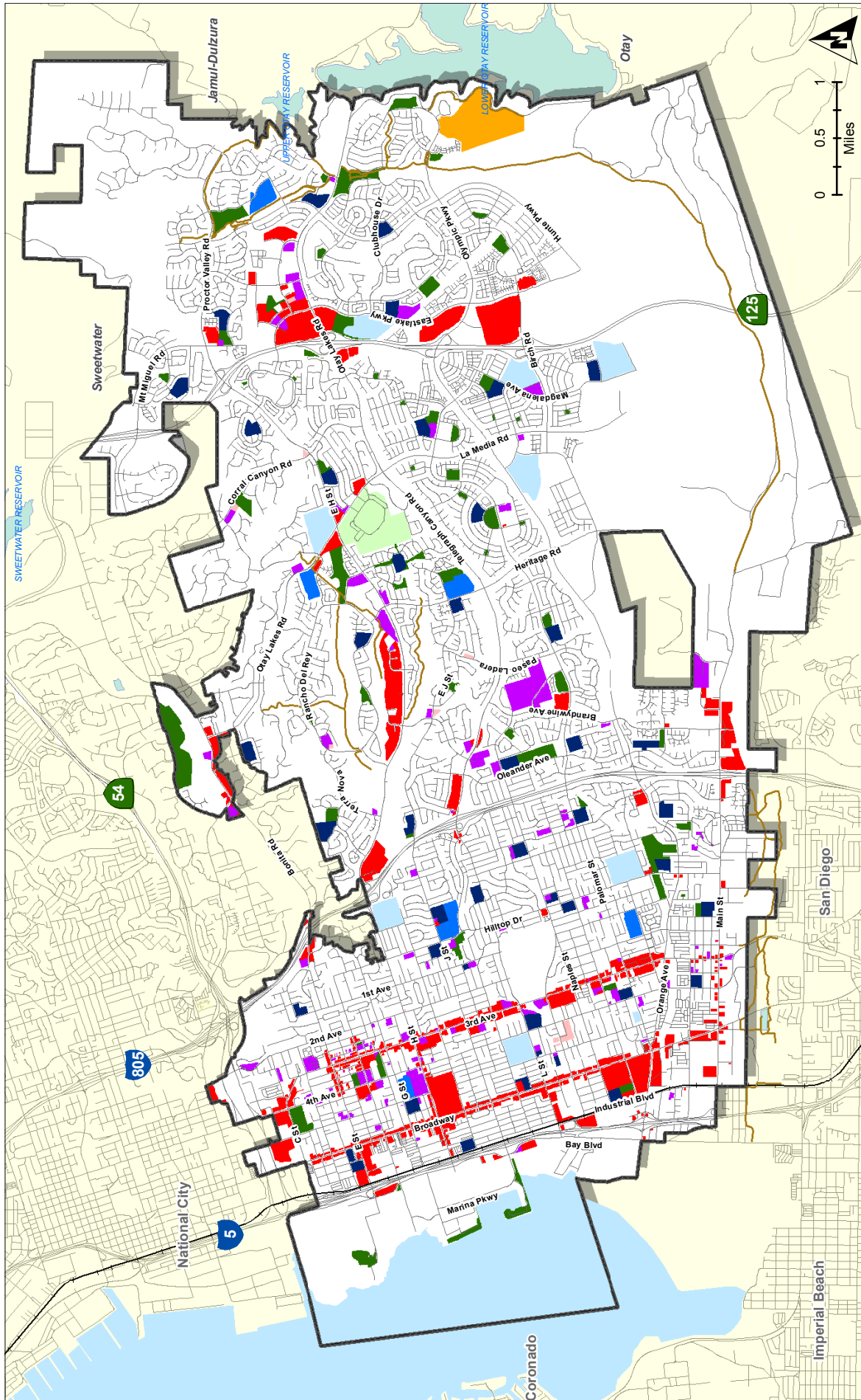


Figure 7: Activity Centers

- | | |
|--|--------------------------|
| | Activity Centers* |
| | Commercial |
| | Public Facilities |
| | Olympic Training Center |
| | Elementary School |
| | Middle School |
| | High School |
| | Junior College |
| | Other School |
| | Parks |

* Source: SANDAG 2009

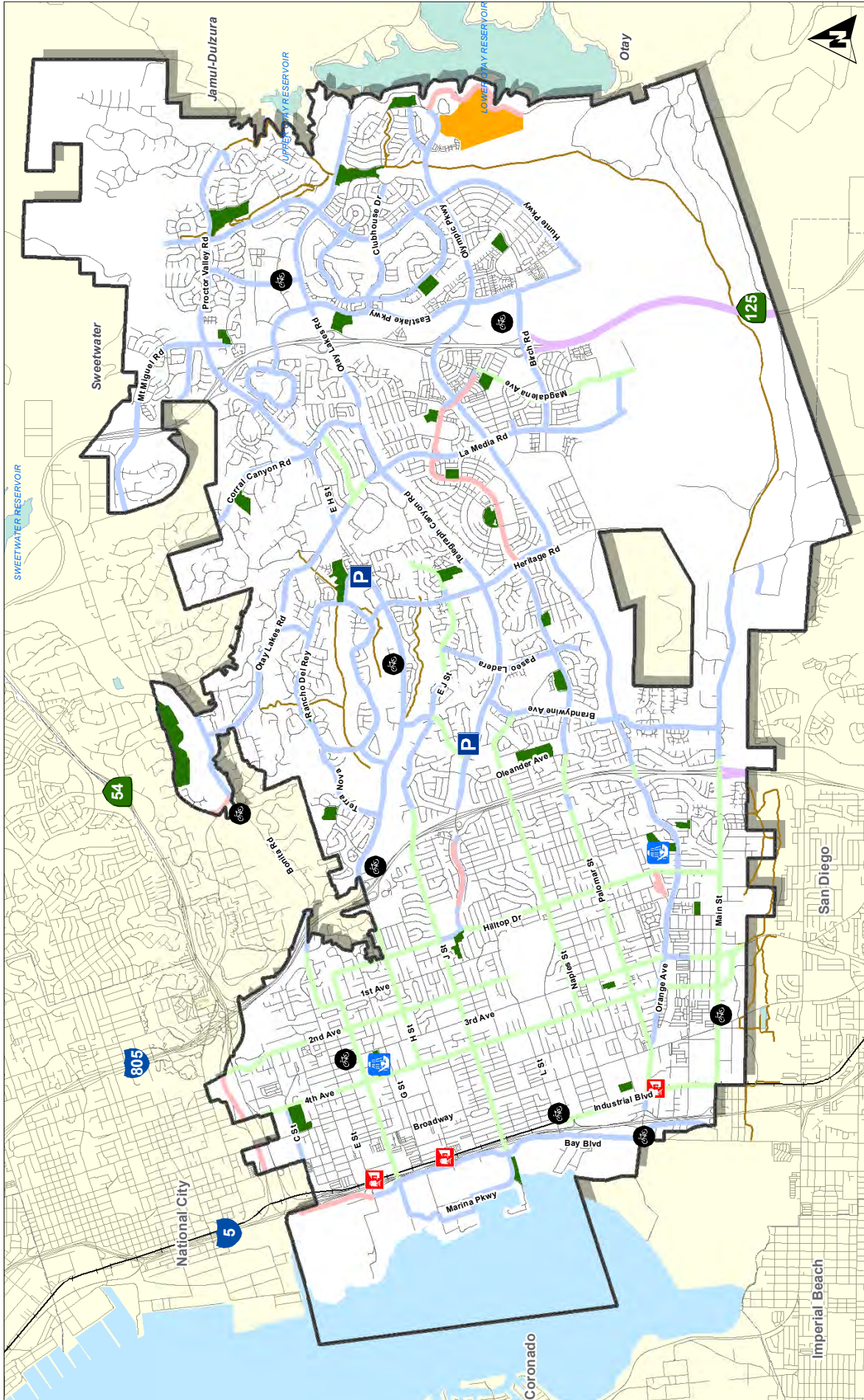


Figure 8: Bicycle Related Amenities

Existing Bicycle Facilities*

- Class 1: Bike Path
- Class 2: Bike Lanes
- Class 3: Bike Route
- Freeway Shoulder

- Park and Rides
- Recreation Centers with Shower Facilities**
- Parks with Public Restrooms**
- BMX Track (Olympic Training Center)
- Trolley Stations with Bike Lockers**

- City of Chula Vista
- Trails
- Railroad
- Lakes
- Bike Shops

* Source: KTU+A 2010
 ** Source: City of Chula Vista 2010

3.3.2 Employment Centers

Employment centers lay primarily along the major north-south thoroughfares in western Chula Vista where concentrations of commercial and office space occur. The south coastal and southwestern boundary areas of Chula Vista also have significant industrial employment centers. The eastern portions of Chula Vista provide some employment in commercial and retail areas, but there is currently little else. Planned land use indicates an increase in commercial development, as well as some areas of mixed use. (See Figure 6: 2000 Employment Density.) Some of the major employment centers and most large government facilities have locker, restroom and shower facilities.

3.3.3 Parks/Schools/Civic Centers

Considering the parks and schools independently of the other activity centers is intended to emphasize the more local, neighborhood and recreational functions of these centers. Like most communities, Chula Vista's parks and athletic facilities are often associated with the school sites. These centers are used by a much higher percentage of children than the other types of activity centers, which is an important factor in community-wide bikeway facility design. The location of schools, in particular, is a major factor in identifying safe bicycle routes because bicycling has traditionally been an important transportation mode for elementary and middle school age children. (See Figure 7: Activity Centers.)



Analysis of the locations of Chula Vista's schools indicates most are adjacent to residential areas with quiet streets. However, Chula Vista's schools are no different than any other city's schools in that many are close to at least one major street. Fortunately, the schools and the residential neighborhoods they serve tend to fall on the same side of the major streets. Therefore, the schools' primary bicycling access is likely to be from the surrounding residential streets that allow children access to their schools without having to ride on the busier streets and minimizes their having to cross them. (See Appendix C: Guidelines for Selecting Safe Routes To School.)

3.3.4 Trip Destination Summary

In most cities, schools and parks are the most common bicycling destinations, followed by commercial, retail and employment centers. This is likely to hold true in Chula Vista as well. The schools will draw users from the immediate residential area of up to approximately a mile, which is the typical maximum distance that most children can be expected to want to ride. The major commercial centers like downtown Chula Vista and the areas along the major thoroughfares can also be expected to be popular destinations and will typically draw users from farther away than the schools. (See Figure 8: Bicycle Related Amenities.) Some of the major employment centers, government facilities, schools and athletic facilities can be expected to have locker, restroom and shower facilities.

There are always special destinations characteristic of a particular community. In Chula Vista these special destinations include the coastal portions of Chula Vista where cycling is easier due to the relatively gentle grades, making them desirable destinations for visitors, as well as residents. Typically, the coastal strip has higher levels of bicycle use than any other part of the City, especially for recreational cycling. Because of its attractiveness for cycling of various types, the coastal portion of Chula Vista should be considered a destination in itself. In addition, the hilly inland south San Diego County area with its rural character and relatively lightly traveled roadways is well known as a hub for competitive athletic training, especially for road cyclists and triathletes. Finally, the singletrack trails within the canyons in eastern Chula Vista draw a number of mountain bikers who can easily access these trails from numerous locations where arterials cross the canyons.

3.4 Multi-modal Analysis

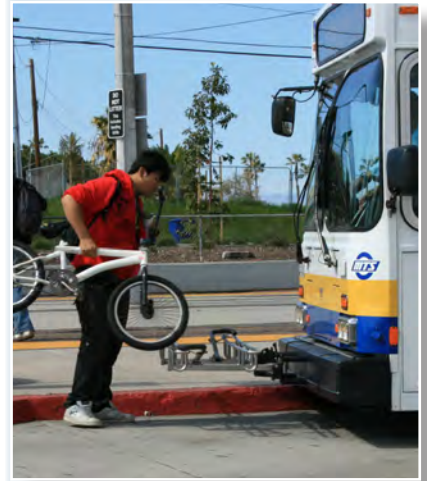
Linking the bikeway facility system with other transportation modes enhances the efficiency of bicycle transportation, especially for commuting. Cyclists can use their bicycles to get to or from a multi-modal transfer point as part of their regular commute. Where transit modes allow bicycles on board, multi-modal transit becomes a very useful transportation option. Whether the other modes allow bicycles to be brought on board or not, they allow for much greater flexibility for persons choosing to commute by modes other than the private automobile.

In the case of Chula Vista, all buses have bicycle racks except those on one short specialized route (708) exclusively serving the Chula Vista Nature Center. All other bus routes employ outside bicycle racks and the San Diego Trolley provides interior space for bicycles. (See Figure 9: Public Transit Service.)

3.4.1 Chula Vista Transit (CVT)

The Chula Vista Transit System (CVT) is part of the greater San Diego regional Metropolitan Transit System (MTS). MTS coordinates fares, transfers, routes and information services for the region. Being part of MTS enables CVT passengers to transfer from one transit system to another in a seamless fashion. CVT interfaces with the San Diego Trolley's Blue Line at the Bayfront/E Street, H Street and Palomar Street Stations. CVT also provides connections to MTS's regional bus route 932 that connects downtown San Diego and San Ysidro.

In general, CVT bus routes run on major thoroughfares that closely correspond with existing bicycle facilities, allowing cyclists to board at a preferred bus stop and putting their bicycle on the bus rack. All but one of CVT's bus routes link with at least one of the three trolley stations and all but one route have bike racks, Route 708, which is a very short loop serving the Chula Vista Nature Center where bicycle and pedestrian access is prohibited.



3.4.2 Metropolitan Transit System (MTS) Trolley

The location of existing transfer points such as trolley stations and bus stops in relation to bikeway facilities was reviewed to determine how well the systems serve the purposes of multi-modal travel.

MTS operates three trolley routes within the greater San Diego region, of which the “Blue Route” serves Chula Vista and the South Bay. There are three MTS trolley stations in Chula Vista within the coastal strip in the westernmost portion of the City. Besides the coastal strip served by the trolley, buses provide public transit services throughout the remainder of the City.

Bike commuters must enter at the front or rear of each trolley car and stand with their bicycle for the duration of the ride. The trolley system limits the number of bicycles per trolley car to two and only one during rush hours (6:00 AM to 9:00 AM and 3:00 PM to 6:00 PM). With two or three cars per train, cyclists can usually find space. Otherwise, they are required to wait for the next train.

Going back to Chula Vista’s 1996 Bikeway Master Plan, the provision of secure bicycle parking is considered an important element in making the connection between commuter cycling and transit use. Bike lockers are the most secure way for cyclists to store their bicycles when they need to leave them unattended when switching to another travel mode such as the trolley or car-pooling since the bicycles are fully enclosed and inaccessible to would-be thieves.

Lockers are available at all three of Chula Vista’s trolley stations under a program administered by SANDAG. There are 18 locker spaces at Bayfront/E Street, 22 at H Street and 12 at Palomar. Bicycle locker use is free with a \$25 key deposit. SANDAG has experienced problems with lockers at its stations including lockers being used for general storage instead of for bicycles and bicycles being stored for long periods without being used. Planned new locker installations will employ units with mesh sides to allow for periodic inspection.

Throughout coastal San Diego County, painted finishes have been difficult to maintain and plain steel lockers routinely corrode. An option that has been successfully tested is installing units constructed of corrosion-free composite or stainless steel. Not only do they not rust, these units employ materials that allow relatively easy graffiti removal.

SANDAG is also planning to replace four to eight existing lockers at each of its three Chula Vista stations with “eLockers,” new electronic, on-demand bicycle lockers. Instead of traditional lock and key mechanisms, eLockers use an electronic “smartcard” with a touch-sensitive imbedded computer



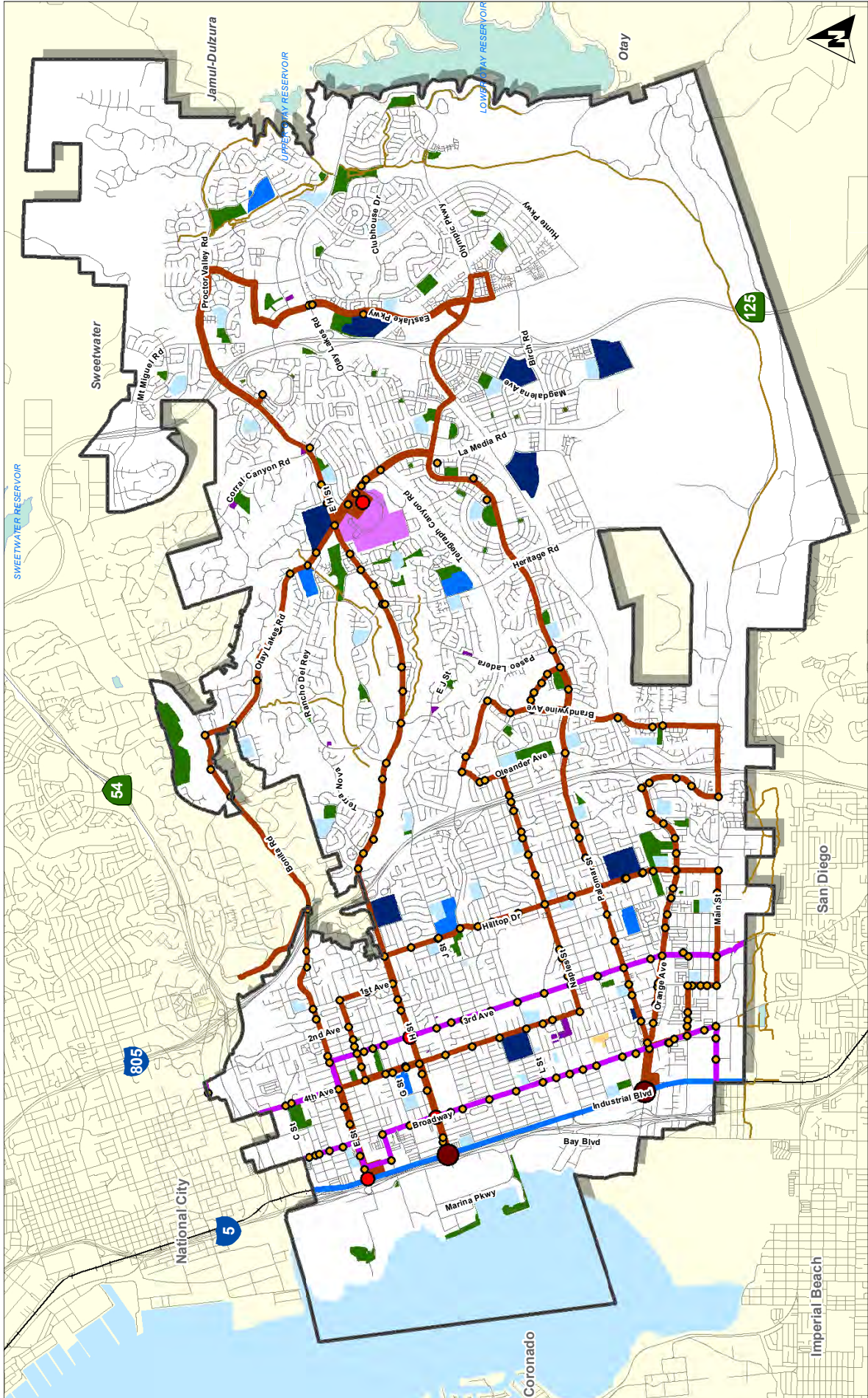
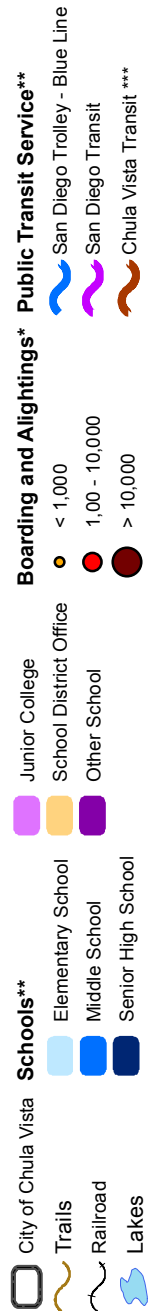


Figure 9: Public Transit Service



* SANDAG 2005
 ** SANDAG 2008
 *** City of Chula Vista

chip. Unlike conventional lockers assigned to a single user, eLockers are available any time they are not in use to anyone participating in the eLocker program. The user pays a \$25 deposit for the electronic key, puts their bicycle into an eLocker, shuts the door and it will only open using that user's key. When the user returns, removes the bicycle and key and closes the eLocker, it is then available to any subsequent eLocker participant.

These on-demand eLockers allow commuters the flexibility to use their bicycles for some of their commute trips on a daily, first-come, first-served basis. When not in use, the on-demand lockers are available to other program participants because cyclists have the flexibility of using a bike locker when they need it, without tying up a locker when they do not. SANDAG's long range plan is to make the lockers compatible with their Compass Card transit pass technology to better integrate the bicycle lockers with overall transit system management.

3.4.3 Bus Rapid Transit (BRT)

Additional regional planning is underway for a bus rapid transit (BRT) system to serve the South Bay area, generally on East Palomar Street east of I-805. At this time, it is unknown whether bicycles will be accommodated on BRT vehicles. If not, it is likely bicycle lockers will be needed at some BRT stops, particularly if the stop is also a transit center serving multiple transit modes such as regular buses and trolleys. Depending on eventual route and stop selection, BRT stops could also be coordinated with new or proposed park-and-ride lots equipped with bicycle lockers.

3.4.4 Existing Park and Ride Facilities

There are two park and ride lots in Chula Vista. (See Figure 8: Bicycle Related Amenities.) Note that neither is equipped with bicycle lockers.

Park and Ride Lot 50: This lot is located in east-central Chula Vista at the corner of Paseo del Rey and Telegraph Canyon Road at the Chula Vista Alliance Church. According to SANDAG, nearby services include bus service and child care.

Park and Ride Lot 56: This lot is located in south-central Chula Vista at the northeast corner of Buena Vista Way and East H Street at the Joy Lutheran Church. According to SANDAG, nearby services include bus service.

3.4.5 Existing Transit Centers

Chula Vista's three trolley stations, Palomar Street, Bayfront/E Street and H Street, are not designated as transit centers, but they are all served by at least three local (CVT) bus routes. The H Street Station is a stop on seven CVT routes, for example.

3.4.6 Multi-Modal Summary

Though light rail trolley service is confined to the far western coastal portion of Chula Vista, the MTS Blue Line does stop at three stations equipped with bike lockers. Cyclists are allowed to bring bicycles on the trolley cars themselves, though on a limited basis.

The remainder of the City is served by bus routes on virtually all major thoroughfares and extending well out into the eastern portion of the City. The location of bus routes appears to correlate with population density because there are considerably more routes west of I-805 than east of it. However, route location probably also correlates with the location of available arterial roadways, which are fewer and farther apart in the eastern part of the City than in the older portion west of I-805 with its traditional grid street system.

Having busses equipped with bike racks serves multi-modal travel at the most fundamental level. The CVT routes do appear to serve the areas of highest employment density, which are generally situated along the major arterials.

3.5 Safety

Safety is a primary concern in evaluating an existing bikeway facility system or in proposing new facilities or extensions. The primary lesson learned from the literature reviewed for this and other bicycle master plans is that installation of bicycle facilities without careful consideration of their specific attributes and drawbacks can actually exacerbate already problematic safety situations. This is particularly true for facilities likely to be used by other types of users such as walkers, runners and skaters, in addition to cyclists. Well-designed, attractive, off-street bicycle facilities tend to become mixed use facilities and the other user types do not move with the relative predictability of vehicles or cyclists. On the other hand, even though they move with more predictability, cyclists using on-street facilities must contend with motorists. Safety concerns therefore vary considerably depending on the type of bicycle facility.

Safety is reviewed in the following sections through mapping data analysis, field experience, applicable literature, examination of user types and capabilities and user questionnaires responses.

3.5.1 User Types and Capabilities

Users can be classified using a number of criteria such as their ages, their cycling experience and physical condition, for examples, to come up with a profile of the types of users expected to make use of a particular bikeway system. Such a user classification is helpful for bikeway planning purposes.

User Classification

The American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities* contains a cyclist classification system to assist in the selection of appropriate facilities. The classification system is as follows:

- Group A - Advanced Cyclists (Experienced): Group A cyclists fall into two categories, commuting/utility and sports /touring.
- Group B - Basic Cyclists (casual, novice, occasional, recreational)
- Group C - Children (preteen)












AASHTO estimates that only about five percent of the cycling population is experienced cyclists. Though there are no data to support this estimate, this is probably accurate enough for general use in the United States. (See Table 4: Bikeway User Classification.)

AASHTO states that, in most circumstances, Group B and Group C cyclists can be combined. However, Group C cyclists are much more likely to ride almost daily, and especially to ride bicycles to and from schools during mornings and afternoons most of the year. This would also include Group B teens. The majority of Group B adult cyclists are more likely to ride on weekends and some evenings during favorable weather since they are more likely to be riding for recreation rather than for commuting. More importantly, the groups also tend to ride on different types of roadways. Group C cyclists tend to stay in residential areas, while Group B cyclists will tend to ride on busier streets if there is sufficient width and bike facilities. Parents will usually not allow their young children to ride on busy streets, even ones with bike facilities. Group A cyclists are accustomed to riding on busy streets, with or without bike facilities.

Experience level tends to determine whether an adult is a Group A or Group B cyclist. Perhaps one way to distinguish between Group A and Group B cyclists is to observe where they wait for a signal to change at intersections. Experienced, Group A cyclists tend to stay far enough to the left of the curb lane to allow right turning motor vehicles to safely pass them on their right. When the light changes, they steer toward the right side of the curb lane across the intersection. This keeps them in direct view of motorists who are also proceeding straight through the intersection and gets them out of

Table 4: Bikeway User Classification

		Typical Ages	Preferred Facility	Typical Usage	Days per Week	Speed Range	Average Distance	Typical Origins and Destinations
Kids		6-16	Sidewalks, trails, quiet streets, flat terrain (Class 1)	Early weekday mornings and afternoons, weekends	5-6	4-8 mph	1-2 miles	Residences, schools, parks, open space, retail centers
Family Recreational		6-70+	Quiet streets, scenic trails, flat terrain (Class 1)	Weekends, occasional early evenings	1	5-10 mph	2-4 miles	Residences, parks, open space
Adult Exercise		25-70+	Quiet streets, scenic trails, flat terrain (Class 1 & 2)	Weekends, occasional early evenings	1-2	8-15 mph	5-20 miles	Residences, parks, open space
Commuters		18-55+	Streets, bike lanes, direct arterial routes (Class 2 & 3)	Early weekday mornings and late afternoons	4-6	10-20 mph	3-20 miles	Residences, employment centers, retail centers
Serious Cyclists		18-55+	Arterials, flat or hilly circuitous routes (Class 2 & 3)	Weekday mornings and late afternoons, weekends	2-5	12-25 mph	20+ miles	Residences (Rides typically originate or extend outside city)
Skaters Skateboarders		8-45	Quiet streets, paved trails, flat terrain, (Class 1)	Weekends, occasional early evenings	1-2	5-15 mph	2-5 miles	Residences, schools, parks
Joggers		18-55	Sidewalks, scenic trails, flat terrain (Class 1)	Early weekday mornings and late afternoons, weekends	3-6	5-9 mph	3-5 miles	Residences, parks, open space
Recreational Walkers		12-70+	Sidewalks, Scenic trails, flat terrain (Class 1)	Weekday mornings and late afternoons, weekends	2-5	2-4 mph	1-2 miles	Residences, parks, retail centers
Exercise Walkers		16-70+	Sidewalks, scenic trails, flat terrain (Class 1)	Weekday mornings and late afternoons, weekends	2-5	3-7 mph	2-4 miles	Residences, parks, open space

these motorists' path as quickly as possible. Since the motorists are starting forward from a standstill, the risk of injury is minimal. Less experienced Group B cyclists tend to hug the curb, even in right turn only lanes, putting them at risk of vehicles turning right across their paths.

Typical bikeway facility system users tend to reflect the AASHTO group categories, though individuals of different groups may choose to ride together, such as when adult parents (Group B) ride with their children (Group C). This combination probably occurs frequently, especially on weekends, but as the AASHTO study author said, these two groups could be combined, making them functionally one group.

For this study, cyclists are classified by AASHTO group. However, since it is likely that any Class 1 bikeway facility will attract users other than cyclists, this study tends to regard bicycle paths as multi-use that will also be used by skaters, joggers, recreational and exercise walkers. Experience has shown this to be the case, and unless the numbers of users become excessive, this mixed use is acceptable. This mixing of uses tends to occur primarily on paths with relatively benign grades. Experienced cyclists who prefer to travel at higher speeds tend to avoid Class 1 facilities that attract other types of slower users in favor of less traveled, more challenging routes, including those with significant hills, with or without Class 2 or 3 facilities.

User Capabilities

Typical user capabilities vary considerably depending on age, experience and physical conditioning. Figure 4: Bikeway User Classification, summarizes the average speeds and distances of which specific user types are generally capable. Note that these averages vary widely within the cyclist groups and within the non-cyclist user types. Many skaters' speeds closely approximate cyclist speeds, for instance, but recreational walkers move considerably slower than most cyclists. Also, it should be noted that speed and maneuverability tend to be inversely proportional.

Another crucial aspect of user capability is experience, which can also be defined as knowledge of appropriate traffic behavior or roadway aptitude. This factor is not as tangibly measured as physical capabilities, but it is no less important. It can probably be assumed that Group A cyclists are far more knowledgeable about appropriate traffic conduct than other cyclists and are likely to be the most attentive users due to long-term roadway experience. However, bikeway facility design and planning must also take into account the other end of the spectrum, meaning not only the much larger numbers of Group B and Group C cyclists, but also the skaters, joggers and walkers likely to use a Class 1 bikeway facility. These users can represent all levels of experience and, therefore, all levels of roadway aptitude.